

WHAT IS CLAIMED IS:

- 1 1. An electron beam lithography system, comprising:
2 an electron column for focusing said electron beam; and
3 an electron gun, said electron gun comprising:
4 at least one laser; and
5 a photocathode substantially comprising cesium telluride and adapted
6 to be activated to generate electrons by said at least one laser and to be
7 regenerated by said at least one laser.

- 1 2. An electron beam lithography system in accordance with claim 1,
2 wherein said photocathode comprises a cesium telluride film on a substrate.

- 1 3. An electron beam lithography system in accordance with claim 2, said
2 photocathode including a metallic film interposed between said cesium telluride layer
3 and said substrate.

- 1 4. An electron beam lithography system in accordance with claim 2,
2 including means for applying a current in a plane of said cesium telluride layer.

- 1 5. A method for electron beam lithography, comprising:
2 applying at least one laser in a first mode to a cesium telluride photocathode
3 for generating electrons; and
4 applying said at least one laser to said cesium telluride photocathode in a
5 second mode to regenerate said cesium telluride photocathode.

- 1 6. A method according to claim 5, wherein in said first mode, said laser is
2 applied at a power density of approximately 10^4 Watts per square centimeter.

- 1 7. A method in accordance with claim 6, wherein in said second mode,
2 said at least one laser is applied at a power density in the range substantially
3 comprising $10^4 - 10^6$ Watts per square centimeter.

1 8. A method in accordance with claim 6, wherein in said second mode,
2 said at least one laser is applied to raise a temperature of said cesium telluride
3 photocathode in the range substantially comprising 20 – 200 C above room
4 temperature.

1 9. A method in accordance with claim 8, a wavelength of said laser
2 comprising approximately 257 nanometers.

1 10. An electron gun, comprising:
2 at least one laser; and
3 a photocathode adapted to be activated to generate electrons by said at least
4 one laser and to be regenerated by said at least one laser

1 11. An electron gun in accordance with claim 10, wherein said
2 photocathode comprises a cesium telluride film on a substrate.

1 12. An electron gun in accordance with claim 11, said photocathode
2 including a metallic film interposed between said cesium telluride layer and said
3 substrate.

1 13. A method, comprising:
2 providing at least one laser; and
3 providing a photocathode adapted to be activated to generate electrons by
4 said at least one laser and to be regenerated by said at least one laser.

1 14. An method in accordance with claim 13, wherein said photocathode
2 comprises a cesium telluride film on a substrate.

1 15. An method in accordance with claim 14, said photocathode including a
2 metallic film interposed between said cesium telluride layer and said substrate..

1 16. An electron beam lithography system, comprising:

2 an electron column; and
3 an electron gun;
4 wherein said electron gun is adapted to apply at least one laser in a first
5 mode to a cesium telluride photocathode for generating electrons; and
6 said electron gun is adapted to apply said at least one laser to said cesium
7 telluride photocathode in a second mode to regenerate said cesium telluride
8 photocathode.

1 17. An electron beam lithography system according to claim 16, wherein in
2 said first mode, said at least one laser is applied at a power density of approximately
3 10^4 Watts per square centimeter.

1 18. An electron beam lithography system in accordance with claim 16,
2 wherein in said second mode, said at least one laser is applied at a power density in
3 the range substantially comprising $10^4 - 10^6$ Watts per square centimeter.

1 19. An electron beam lithography system in accordance with claim 16,
2 wherein in said second mode, said at least one laser is applied to raise a
3 temperature of said cesium telluride photocathode in the range substantially
4 comprising 20 – 200 C above room temperature.

1 20. An electron beam lithography system in accordance with claim 19, a
2 wavelength of said laser comprising approximately 257 nanometers.

1 21. A controller for an electron beam lithography system, said controller
2 adapted to control application of at least one laser to a photocathode in a first mode
3 for generating electrons and in a second mode for regenerating said photocathode.

1 22. A controller in accordance with claim 21, said photocathode comprising
2 a cesium telluride photocathode.

1 23. A controller according to claim 21, wherein said controller is adapted to

2 control application of said at least one laser in said first mode, such that said at least
3 one laser is applied at a power density of approximately 10^4 Watts per square
4 centimeter.

1 24. A controller in accordance with claim 21, wherein said controller is
2 adapted to control application of said at least one laser in said second mode, such
3 that said at least one laser is applied at a power density in the range substantially
4 comprising $10^4 - 10^6$ Watts per square centimeter.

1 25. A controller in accordance with claim 21, wherein said controller is
2 adapted to control application of said at least one laser in said second mode, such
3 that said at least one laser is applied to raise a temperature of said cesium telluride
4 photocathode in the range substantially comprising 20 – 200 C above room
5 temperature.